CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

AMENDMENTS TO THE WATER QUALITY CONTROL PLAN FOR THE SACRAMENTO RIVER AND SAN JOAQUIN RIVER BASINS

FOR

THE CONTROL OF DIAZINON AND CHLORPYRIFOS RUNOFF INTO THE SACRAMENTO AND FEATHER RIVERS

APPENDIX A

SUMMARY OF MONITORING PROGRAMS AND STUDIES USED AS SOURCES OF DIAZINON AND CHLORPYRIFOS DATA.

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The following studies provided data used to analyze historical diazinon and chlorpyrifos concentrations (**Section 2.0** of the Staff Report) in the Sacramento and Feather River Watersheds.

Reference	Monitoring Time Period	Location
Calanchini, H.J. and M.J. Johnson. A Brief Summary of the 2005 TMDL Monitoring for Diazinon and Chlorpyrifos in California's Central Valley Waterways, January - February 2005. John Muir Institute of the Environment University of California, Davis. June 2005.	2/18/2005 To 2/19/2005	Colusa Basin Drain Feather River Near Outlet Sacramento River At Alamar Sacramento River At Colusa Sacramento River At Sacramento Sacramento Slough
Calanchini, H.J., A.B. Wehrmann, A.M. King, E.R. Huber, R.E. Trout and M.J. Johnson. Presence of Diazinon and Chlrorpyrifos in California's Central Valley Water Ways, January-March 2003. John Muir Institute of the Environment, University of California, Davis. August 2003.	1/13/2003 To 2/18/2003	American R At Discovery Park Butte Slough Colusa Basin Drain Main Drainage Canal Natomas East Main Drain At Dp Sacramento River At Colusa Sacramento River At Sacramento Wadsworth Canal
Calanchini, H.J., A.B. Wehrmann, and M.L. Johnson. 2004. A Brief Summary of the 2004 TMDL Monitoring for Diazinon in California's Sacramento Valley Waterways, January-March 2004. John Muir Institute of the Environment, University of California, Davis. June 2004.	1/30/2004 To 2/20/2004	Colusa Basin Drain Feather River Near Outlet Sacramento River At Alamar Sacramento River At Colusa Sacramento River At Sacramento Sacramento Slough Wadsworth Canal
Dileanis, P. 2003a. Data from 2001 dormant spray season water quality monitoring performed by US Geological Survey and the California Department of Pesticide Regulation. U.S. Geological Survey Water-Resources Investigations Report 03-4111. US Geological Survey. Sacramento, CA.	2/14/2001 To 2/9/2001	Bear River Big Chico Ck At Chico Big Chico Ck Near Mouth Butte Creek Butte Slough Dwr Pump Plant 1 Dwr Pump Plant 2, North Dwr Pump Plant 2, South Feather River At Yuba City Feather River Near Outlet Jack Slough Lindo Ck

Reference	Monitoring Time Period	Location
		Little Chico Ck Main Drainage Canal Mud Ck Sacramento River At Alamar Sacramento River At Colusa Sacramento River At Hamilton City Sacramento River At Sacramento Stony Ck Wadsworth Canal
Dileanis, P. 2003a. Data from 2002 dormant spray season water quality monitoring performed by US Geological Survey and the California Department of Pesticide Regulation. US Geological Survey. Sacramento, CA.	2/16/2002 To 1/31/2002	Butte Slough Dwr Pump Plant 2, North Dwr Pump Plant 2, South Feather River Near Gridley Feather River Near Outlet Jack Slough Main Drainage Canal Sacramento River At Alamar Sacramento River At Colusa Sacramento River At Freeport Sacramento Slough Wadsworth Canal
Dileanis, P. 2003a. Data from 2003 dormant spray season water quality monitoring performed by US Geological Survey and the California Department of Pesticide Regulation. US Geological Survey. Sacramento, CA.	1/11/2003 To 2/16/2003	Feather River Near Outlet Sacramento River At Alamar Sacramento River At Sacramento Sacramento Slough
Dileanis, P., K.P. Bennett and J.L. Domagalski. 2002. Occurrences and Transport of Diazinon in the Sacramento River, California, and Selected Tributaries During Three Winter Storms, January-February 2000. U.S. Geological Survey Water-Resources Investigations Report 02-4101. US Geological Survey. Sacramento, CA.	2/21/2002 To 1/31/2000	Bear River Butte Creek Butte Slough Cherokee Canal Colusa Basin Drain Dwr Pump Plant 1 Dwr Pump Plant 2, North Dwr Pump Plant 2, South Feather Riveriver At Yuba City Feather River Near Gridley Feather River Near Outlet Gilsizer Slough Jack Slough

Reference	Monitoring Time Period	Location
		Main Drainage Canal Sacramento River At Alamar Sacramento River At Colusa Sacramento River At Sacramento Sacramento Slough Wadsworth Canal Yuba R At Marysville
Domagalski, J.L. 2000. Pesticides in Surface Water Measured at Select Sites in the Sacramento River Basin, California, 1996-1998. Water Resources Investigations Report 00-4203. USGS.	4/23/1998 To 3/9/1998	Arcade Ck Near Del Paso Heights Colusa Basin Drain Sacramento River At Freeport
DPR 2006. California Department of Pesticide Regulation (DPR) Surface Water Database. Available at http://www.cdpr.ca.gov/docs/sw/surfcont.htm. Accessed 3 Aug 2006.	2/12/2001 To 6/11/1996	American R At Discovery Park Arcade Ck At Norwood Ave. Arcade Ck Near Del Paso Heights Bear River Big Chico Ck Butte Creek Butte Slough Cherokee Canal Clarks Ditch Colusa Basin Drain Deer Ck Feather River At Yuba City Feather River Near Olivehurst Feather River Near Outlet Gilsizer Slough Jack Slough Main Drainage Canal Mill Ck Sac Outfall Sacramento River Above Bend Bridge Sacramento River At Alamar Sacramento River At Colusa Sacramento River At Freeport Sacramento River At Hamilton City Sacramento River At Sacramento Sacramento Slough Sutter Bypass At Karnak

Reference	Monitoring Time Period	Location
		Sutter Bypass At Kirkville Rd Wadsworth Canal Yuba R At Marysville
DWR 2006b. California Department of Water Resources (DWR) Water Data Library. Available at http://wdl.water.ca.gov/index.cfm. Accessed 10 May 2006.	3/5/2001 9:45:00 AM To 2/7/2001 9:30:00 AM	Feather River At Oroville Feather River At Yuba City Feather River Near Gridley Feather River Near Olivehurst Feather River Near Outlet Sacramento River Above Bend Bridge Sacramento River At Balls Ferry Sacramento River At Colusa Sacramento River At Hamilton City Sacramento River At Keswick Sacramento River At Red Bluff Sacramento River At Verona Sacramento River At Vina Sacramento Slough
Foe, C. and Sheipline, R. 1993. Pesticides in Surface water from Applications on Orchards and Alfalfa during the Winter and Spring of 1991-1992. Central Valley Regional Water Quality Control Board Staff Report. Sacramento, CA. also SWDB study 43	2/17/1992 To 2/10/1992	Clarks Ditch Feather River Near Olivehurst Gilsizer Slough
Foe, C., Deanovic, D. and Hinton, D. 1998. Toxicity Identification Evaluations of Orchard Dormant Spray Storm Runoff. California Environmental Protection Agency and Regional Water Quality Control Board Central Valley Region. Sacramento, CA.	1/24/1997 To 1/25/1997	Sacramento Slough
Ganapathy, C., C. Nordmark, K. Bennet, A. Bradley, H. Feng, J. Hernandez, J. White. 1997 Temporal Distribution of Insecticide Concentrations in Four California Rivers. California Department of Pesticide Regulation. Sacramento, CA. also SWDB study 14	5/31/1994 To 1/24/1994	Sacramento Slough
Gill, S. 2002. Preliminary Results of Acute and Chronic Toxicity Testing of Surface Water Monitored in the Sacramento River Watershed, Winter 2000-2001. California Department of Pesticide Regulation. Sacramento, CA.	2/21/2001 To 1/8/2001	Sacramento River At Alamar Sutter Bypass At Karnak Wadsworth Canal
Holmes, R., V. de Vlaming and C. Foe. 2000. Sources and Concentrations of Diazninon in the Sacramento Watershed During the 1994 Orchard Dormant Spray Season. Central Valley Regional Water Quality Control Board Staff Report. July 2000.	1/24/1994 To 1/25/1994	Bear River Butte Slough Colusa Basin Drain Feather River At Yuba City

Reference	Monitoring Time Period	Location
		Feather River Near Outlet Honcut Ck Jack Slough Main Drainage Canal Obanion Outfall Sac Outfall Sacramento River Above Bend Bridge Sacramento River At Butte City Sacramento River At Colusa Sacramento River At Hamilton City Sacramento River At Ordbend Rd Bridge Sacramento River At Red Bluff Sacramento River At Vina Sacramento Slough Wadsworth Canal Yuba R At Marysville
John Muir Institute 2006. Results of the 2006 TMDL Monitoring of Pesticides In California's Central Valley Waterways January - March 2006. University of California. October 2006	1/14/2006 To 2/28/2006	Angel Canal/Comanchee Creek Gilsizer Slough Live Oak Slough At Nuestro Road Morrison Slough At Luckehe Road Sacramento River At Alamar Sacramento River At Freeport
Larry Walker Associates, 2002b. Sacramento River Watershed Program (SRWP) Waters Quality Database. Larry Walker Associates, April 2002.	9/20/2000 To 8/17/1999	American R At Discovery Park Arcade Ck At Norwood Ave. Big Chico Ck Butte Creek Clear Ck Colusa Basin Drain Deer Ck Feather River Near Outlet Mill Ck Sacramento River Above Bend Bridge Sacramento River At Alamar Sacramento River At Colusa Sacramento River At Freeport

Reference	Monitoring Time Period	Location
		Sacramento River At Hamilton City Sacramento River At Keswick Sacramento Slough Yuba R At Marysville
Larry Walker Associates, 2005. Sacramento River Watershed Program (SRWP) Waters Quality Database Larry Walker Associates, December 2005.	11/12/2002 To 1/24/2003	Arcade Ck At Norwood Ave. Big Chico Ck Colusa Basin Drain Deer Ck Feather River Near Outlet Mill Ck Natomas East Main Drain At Dp Sacramento River At Alamar Sacramento River At Colusa Sacramento River At Hamilton City Sacramento Slough Yuba R At Marysville
Larry Walker Associates. 1996. Sacramento Coordinated Water Quality Monitoring Program 1995 Annual Report. Larry Walker Associates. Davis, CA.	1/18/1995 To 2/14/1995	Sacramento River At Alamar Sacramento River At Freeport Sacramento River Mile 44 American R At Discovery Park Sacramento River At Alamar Sacramento River At Freeport Sacramento River Mile 44
Larsen, K. and Perez, R. 2000. Sacramento River Watershed Program Toxicity Testing Data Results Summary: 1998-99. California Environmental Protection Agency and Regional Water Quality Control Board Central Valley Region. Sacramento, CA.	12/15/1998 To 2/17/1999	Arcade Ck At Norwood Ave.
Larsen, K., Connor, V., Deanovic, L. and Hinton, D. 1998. Sacramento River Watershed Program Toxicity Monitoring Results: 1997-1998. Prepared for the Sacramento Regional County Sanitation District. Sacramento, CA.	3/18/1998 To 5/28/1997	Arcade Ck At Norwood Ave. Feather River Near Outlet Sacramento Slough
List, K., Larsen, K. and Stafford, B. 2002. Sacramento River Watershed Program Toxicity Testing Data Summary: 1999-2000. California Environmental Protection Agency and Regional Water Quality Control Board Central Valley Region. Sacramento, CA.	4/19/2000 To 2/16/2000	Arcade Ck At Norwood Ave. Feather River Near Outlet Sacramento Slough
MacCoy, D., K.L. Crepeau and K.M. Kuivila. 1995. Dissolved Pesticide Data for the San Joaquin River at Vernalis and the Sacramento River at Sacramento, California, 1991-94. U.S. Geological Survey Open-File Report 95-110.	5/20/1992 To 10/14/1991	Sacramento River At Sacramento

Reference	Monitoring Time Period	Location
Nordmark, C.E., K. Bennet, H. Feng, J. Hernandez, and P. Lee. 1998a. Occurrence of Aquatic Toxicity and Dormant-Spray Pesticide Detection in the Sacramento River Watershed, Winter 1996-1997. California Department of Pesticide Regulation. Sacramento, CA.	2/17/1997 To 12/2/1996	Sacramento River At Bryte Sutter Bypass At Karnak Sutter Bypass At Kirkville Rd
Nordmark, CE. 1998. Preliminary Results of Acute and Chronic Toxicity Testing of Surface Water Monitored in the Sacramento River Watershed, Winter 1997-98. California Department of Pesticide Regulation. Sacramento, CA.	1/26/1998 To 1/14/1998	Sacramento River At Alamar Sutter Bypass At Karnak Sutter Bypass At Kirkville Rd
Nordmark, CE. 1999. Preliminary Results of Acute and Chronic Toxicity Testing of Surface Water Monitored in the Sacramento River Watershed, Winter 1998-99. California Department of Pesticide Regulation. Sacramento, CA.	12/7/1998 To 2/17/1999	Sacramento River At Alamar Sutter Bypass At Karnak Sutter Bypass At Kirkville Rd Wadsworth Canal
Nordmark, CE. 2000. Preliminary Results of Acute and Chronic Toxicity Testing of Surface Water Monitored in the Sacramento River Watershed, Winter 1999-2000. California Department of Pesticide Regulation. Sacramento, CA.	2/2/2000 To 1/17/2000	Sacramento River At Alamar Sutter Bypass At Karnak Sutter Bypass At Kirkville Rd Wadsworth Canal
NWIS 2006. United States Geological Survey (USGS) National Water Information System (NWIS). Available at http://waterdata.usgs.gov/nwis. Accessed 4 Aug 2006.	4/12/2001 To 2/13/2003	Arcade Ck Near Del Paso Heights Colusa Basin Drain Feather River Near Outlet Main Drainage Canal Sacramento River At Alamar Sacramento River At Freeport Sacramento Slough Wadsworth Canal
Sacramento City and County stormwater NPDES permit monitoring. also SWDB study 51	10/25/1991 To 10/26/1991	American R At Discovery Park
SRCSD 2006. E-mail correspondence between Paul Hann (Environmental Scientist, Central Valley Regional Water Resources Control Board) and Steve Nebozuk, P.E. (Sacramento Regional County Sanitation District (SRCSD), Water Quality Section Policy and Planning Division) dated 9 Aug 2006 regarding recent unpublished water quality monitoring data.	12/14/2003 To 10/1/2002	Sacramento River At Alamar Sacramento River At Freeport

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APPENDIX B

COMPARISON OF SAMPLE DATA TO THE EXISTING AND PROPOSED OBJECTIVES

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B1. Comparison of Diazinon Data to Existing and Proposed Diazinon Objectives for Sample Locations within the Sacramento and Feather Rivers Watersheds

Location	Water Year	#of samples	Median	90th Percentile	Max	Samples Exceeding 50ng/L	%>50	Samples Exceeding 100ng/L%	%>100	Samples Exceeding 80ng/L	%>80	Samples Exceeding 160ng/L	%>160
American River at Discovery Park	1991	3	0	0	0	0	0%	0	0%	0	0%	0	0%
	1992	2	0	0	0	0	0%	0	0%	0	0%	0	0%
	1997	11	0	25	30	0	0%	0	0%	0	0%	0	0%
	1998	9	0	20	20	0	0%	0	0%	0	0%	0	0%
	1999	13	0	30	100	1	8%	0	0%	1	8%	0	0%
	2000	2	0	0	0	0	0%	0	0%	0	0%	0	0%
	2001	12	0	47	50	0	0%	0	0%	0	0%	0	0%
	2002	11	0	0	0	0	0%	0	0%	0	0%	0	0%
	2003	21	0	9	18	0	0%	0	0%	0	0%	0	0%
Arcade Creek at Norwood Ave.	1996	2	481	546	562	2	100%	2	100%	2	100%	2	100%
	1997	6	470	973	1,332	6	100%	6	100%	6	100%	6	100%
	1998	10	245	383	460	7	70%	6	60%	7	70%	6	60%
	1999	18	140	423	440	12	67%	12	67%	12	67%	7	39%
	2000	18	225	370	830	17	94%	16	89%	16	89%	12	67%
	2001	7	60	320	470	4	57%	3	43%	3	43%	2	29%
	2002	5	0	660	1,100	1	20%	1	20%	1	20%	1	20%
	2003	4	440	914	1,100	4	100%	4	100%	4	100%	4	100%
	2004	4	0	448	640	1	25%	1	25%	1	25%	1	25%
Arcade Creek near Del Paso Heights	1996	1	216	216	216	1	100%	1	100%	1	100%	1	100%
	1997	23	295	537	1,380	23	100%	22	96%	23	100%	21	91%
	1998	5	211	362	420	5	100%	5	100%	5	100%	5	100%
	2001	10	232	406	590	10	100%	9	90%	9	90%	8	80%
	2002	9	153	403	430	9	100%	9	100%	9	100%	4	44%
	2003	9	168	382	588	8	89%	7	78%	7	78%	5	56%
	2004	11	37	170	218	5	45%	2	18%	2	18%	2	18%

Location	Water Year	#of samples	Median	90th Percentile	Max	Samples Exceeding 50ng/L	%>50	Samples Exceeding 100ng/L%	%>100	Samples Exceeding 80ng/L	%>80	Samples Exceeding 160ng/L	%>160
	2005	20	27	66	85	4	20%	0	0%	1	5%	0	0%
Bear River	1994	8	15	149	169	2	25%	2	25%	2	25%	1	13%
	2000	6	27	116	195	1	17%	1	17%	1	17%	1	17%
	2001	10	47	55	55	3	30%	0	0%	0	0%	0	0%
Big Chico Creek	2001	4	0	0	0	0	0%	0	0%	0	0%	0	0%
	2002	2	0	0	0	0	0%	0	0%	0	0%	0	0%
	2003	3	0	0	0	0	0%	0	0%	0	0%	0	0%
Big Chico Creek at Chico	2001	9	0	21	24	0	0%	0	0%	0	0%	0	0%
Big Chico Creek near mouth	2001	9	0	30	62	1	11%	0	0%	0	0%	0	0%
Butte Creek	2000	7	29	59	75	1	14%	0	0%	0	0%	0	0%
	2001	40	28	54	59	6	15%	0	0%	0	0%	0	0%
Butte Slough	1994	28	120	305	1,000	23	82%	15	54%	18	64%	9	32%
	2000	9	44	60	82	3	33%	0	0%	1	11%	0	0%
	2001	12	29	40	53	1	8%	0	0%	0	0%	0	0%
	2002	7	60	73	77	5	71%	0	0%	0	0%	0	0%
	2003	17	21	27	33	0	0%	0	0%	0	0%	0	0%
Cherokee Canal	2000	3	65	69	70	2	67%	0	0%	0	0%	0	0%
Clarks Ditch	1992	3	660	1,260	1,410	3	100%	3	100%	3	100%	3	100%
Clear Creek	2001	4	0	0	0	0	0%	0	0%	0	0%	0	0%
Colusa Basin Drain	1994	29	42	282	370	11	38%	7	24%	9	31%	5	17%
	1996	1	0	0	0	0	0%	0	0%	0	0%	0	0%
	1997	15	4	38	73	1	7%	0	0%	0	0%	0	0%
	1998	5	34	73	98	1	20%	0	0%	1	20%	0	0%
	1999	7	0	0	0	0	0%	0	0%	0	0%	0	0%
	2000	16	0	37	100	1	6%	0	0%	1	6%	0	0%
	2001	7	0	24	60	1	14%	0	0%	0	0%	0	0%
	2002	5	0	0	0	0	0%	0	0%	0	0%	0	0%

Location	Water Year	#of samples	Median	90th Percentile	Max	Samples Exceeding 50ng/L	%>50	Samples Exceeding 100ng/L%	%>100	Samples Exceeding 80ng/L	%>80	Samples Exceeding 160ng/L	%>160
	2003	22	16	48	140	2	9%	1	5%	1	5%	0	0%
	2004	18	58	152	180	13	72%	4	22%	4	22%	2	11%
	2005	11	18	26	34	0	0%	0	0%	0	0%	0	0%
Deer Creek	2001	4	0	0	0	0	0%	0	0%	0	0%	0	0%
	2002	2	0	0	0	0	0%	0	0%	0	0%	0	0%
	2003	3	0	0	0	0	0%	0	0%	0	0%	0	0%
DWR Pump Plant 1	2000	12	68	471	878	10	83%	3	25%	5	42%	3	25%
	2001	10	137	283	355	10	100%	9	90%	9	90%	3	30%
DWR Pump Plant 2, north	2000	2	43	55	58	1	50%	0	0%	0	0%	0	0%
	2001	11	61	80	90	6	55%	0	0%	1	9%	0	0%
DWR Pump Plant 2,south	2000	5	150	357	375	5	100%	4	80%	5	100%	2	40%
	2001	11	50	143	255	5	45%	3	27%	3	27%	1	9%
Feather River at Oroville	2001	1	0	0	0	0	0%	0	0%	0	0%	0	0%
	2002	3	0	0	0	0	0%	0	0%	0	0%	0	0%
	2003	7	0	0	0	0	0%	0	0%	0	0%	0	0%
	2004	3	0	0	0	0	0%	0	0%	0	0%	0	0%
Feather River at Yuba City	1994	28	0	100	166	8	29%	2	7%	6	21%	1	4%
	2000	9	52	93	97	5	56%	0	0%	2	22%	0	0%
	2001	10	0	18	20	0	0%	0	0%	0	0%	0	0%
	2002	2	0	0	0	0	0%	0	0%	0	0%	0	0%
	2003	4	0	0	0	0	0%	0	0%	0	0%	0	0%
	2004	4	0	0	0	0	0%	0	0%	0	0%	0	0%
	2005	1	0	0	0	0	0%	0	0%	0	0%	0	0%
Feather River near Gridley	2002	3	9	13	14	0	0%	0	0%	0	0%	0	0%
	2003	2	0	0	0	0	0%	0	0%	0	0%	0	0%
	2004	1	0	0	0	0	0%	0	0%	0	0%	0	0%
Feather River near Olivehurst	1992	1	80	80	80	1	100%	0	0%	0	0%	0	0%
	2002	1	0	0	0	0	0%	0	0%	0	0%	0	0%

Location	Water Year	#of samples	Median	90th Percentile	Max	Samples Exceeding 50ng/L	%>50	Samples Exceeding 100ng/L%	%>100	Samples Exceeding 80ng/L	%>80	Samples Exceeding 160ng/L	%>160
	2003	2	0	0	0	0	0%	0	0%	0	0%	0	0%
	2004	1	0	0	0	0	0%	0	0%	0	0%	0	0%
Feather River near outlet	1994	30	14	260	834	9	30%	6	20%	7	23%	4	13%
	1996	10	0	0	0	0	0%	0	0%	0	0%	0	0%
	1997	13	0	0	98	1	8%	0	0%	1	8%	0	0%
	1998	6	0	257	515	1	17%	1	17%	1	17%	1	17%
	2000	20	24	60	130	4	20%	1	5%	1	5%	0	0%
	2001	18	5	16	28	0	0%	0	0%	0	0%	0	0%
	2002	16	7	33	47	0	0%	0	0%	0	0%	0	0%
	2003	21	8	14	22	0	0%	0	0%	0	0%	0	0%
	2004	21	14	40	110	1	5%	1	5%	1	5%	0	0%
	2005	10	13	15	19	0	0%	0	0%	0	0%	0	0%
Gilsizer Slough	1992	5	3,390	5,692	6,840	5	100%	5	100%	5	100%	5	100%
	2000	3	190	274	295	3	100%	3	100%	3	100%	3	100%
	2004	2	8	15	17	0	0%	0	0%	0	0%	0	0%
	2005	1	14	14	14	0	0%	0	0%	0	0%	0	0%
Honcut Creek	1994	9	40	118	175	4	44%	2	22%	2	22%	1	11%
Jack Slough	1994	9	245	548	802	9	100%	9	100%	9	100%	7	78%
	2000	10	247	522	727	10	100%	10	100%	10	100%	7	70%
	2001	12	86	103	105	11	92%	3	25%	7	58%	0	0%
Lindo Creek	2001	2	157	179	185	2	100%	2	100%	2	100%	1	50%
Little Chico Creek	2001	2	74	121	133	1	50%	1	50%	1	50%	0	0%
Main Drainage Canal	1994	10	478	1,503	2,450	9	90%	9	90%	9	90%	7	70%
	2000	3	1,999	2,712	2,890	3	100%	2	67%	3	100%	2	67%
	2001	40	71	101	175	34	85%	7	18%	17	43%	1	3%
	2002	55	66	168	218	35	64%	21	38%	25	45%	7	13%
	2003	35	28	100	180	9	26%	3	9%	6	17%	1	3%
Mill Creek	2001	4	0	0	0	0	0%	0	0%	0	0%	0	0%

Location	Water Year	#of samples	Median	90th Percentile	Max	Samples Exceeding 50ng/L	%>50	Samples Exceeding 100ng/L%	%>100	Samples Exceeding 80ng/L	%>80	Samples Exceeding 160ng/L	%>160
	2002	2	0	0	0	0	0%	0	0%	0	0%	0	0%
	2003	3	0	0	0	0	0%	0	0%	0	0%	0	0%
Mud Creek	2001	2	34	45	48	0	0%	0	0%	0	0%	0	0%
Natomas East Main Drain at DP	2003	24	35	93	120	9	38%	2	8%	5	21%	0	0%
	2004	4	0	0	0	0	0%	0	0%	0	0%	0	0%
Obanion Outfall	1994	10	223	567	670	8	80%	7	70%	7	70%	6	60%
Sacramento Outfall	1994	10	272	1,103	2,300	10	100%	9	90%	9	90%	7	70%
Sacramento River above Bend Bridge	1994	3	0	0	0	0	0%	0	0%	0	0%	0	0%
	2000	1	0	0	0	0	0%	0	0%	0	0%	0	0%
	2001	1	0	0	0	0	0%	0	0%	0	0%	0	0%
Sacramento River at Alamar	1995	3	50	66	70	1	33%	0	0%	0	0%	0	0%
	1997	11	0	11	21	0	0%	0	0%	0	0%	0	0%
	1998	40	0	95	171	14	35%	4	10%	7	18%	1	3%
	1999	45	0	0	11	0	0%	0	0%	0	0%	0	0%
	2000	60	0	39	65	3	5%	0	0%	0	0%	0	0%
	2001	33	0	37	77	1	3%	0	0%	0	0%	0	0%
	2002	37	0	24	28	0	0%	0	0%	0	0%	0	0%
	2003	35	0	15	51	1	3%	0	0%	0	0%	0	0%
	2004	27	19	54	220	3	11%	2	7%	2	7%	1	4%
	2005	17	0	8	11	0	0%	0	0%	0	0%	0	0%
	2006	6	0	0	0	0	0%	0	0%	0	0%	0	0%
Sacramento River at Balls Ferry	2001	2	0	0	0	0	0%	0	0%	0	0%	0	0%
Sacramento River at Bryte	1997	24	0	61	65	4	17%	0	0%	0	0%	0	0%
Sacramento River at Butte City	1994	1	110	110	110	1	100%	1	100%	1	100%	0	0%
Sacramento River at	1994	29	20	91	200	6	21%	3	10%	4	14%	1	3%

Location	Water Year	#of samples	Median	90th Percentile	Max	Samples Exceeding 50ng/L	%>50	Samples Exceeding 100ng/L%	%>100	Samples Exceeding 80ng/L	%>80	Samples Exceeding 160ng/L	%>160
Colusa	1999	7	0	0	0	0	0%	0	0%	0	0%	0	0%
	2000	19	0	34	77	2	11%	0	0%	0	0%	0	0%
	2001	25	0	26	43	0	0%	0	0%	0	0%	0	0%
	2002	13	8	13	24	0	0%	0	0%	0	0%	0	0%
	2003	20	0	11	55	1	5%	0	0%	0	0%	0	0%
	2004	19	14	85	160	4	21%	2	11%	2	11%	0	0%
	2005	11	0	0	0	0	0%	0	0%	0	0%	0	0%
Sacramento River at Hamilton City	1994	4	60	115	134	2	50%	1	25%	1	25%	0	0%
	1999	6	0	0	0	0	0%	0	0%	0	0%	0	0%
	2000	9	0	0	0	0	0%	0	0%	0	0%	0	0%
	2001	14	0	0	0	0	0%	0	0%	0	0%	0	0%
	2002	4	0	0	0	0	0%	0	0%	0	0%	0	0%
	2003	4	0	0	0	0	0%	0	0%	0	0%	0	0%
	2004	4	0	28	40	0	0%	0	0%	0	0%	0	0%
Sacramento River at Keswick	2000	1	0	0	0	0	0%	0	0%	0	0%	0	0%
	2001	1	0	0	0	0	0%	0	0%	0	0%	0	0%
Sacramento River at Ordbend Rd Bridge	1994	4	63	97	100	2	50%	0	0%	2	50%	0	0%
Sacramento River at Red Bluff	1994	1	80	80	80	1	100%	0	0%	0	0%	0	0%
	2001	1	0	0	0	0	0%	0	0%	0	0%	0	0%
Sacramento River at Sacramento	1991	48	0	0	9	0	0%	0	0%	0	0%	0	0%
	1992	139	0	22	155	4	3%	1	1%	1	1%	0	0%
	1993	173	0	58	307	20	12%	9	5%	10	6%	5	3%
	1994	78	0	78	253	10	13%	6	8%	8	10%	3	4%
	1995	2	16	26	29	0	0%	0	0%	0	0%	0	0%
	2000	16	27	42	61	1	6%	0	0%	0	0%	0	0%
	2001	12	19	59	96	2	17%	0	0%	1	8%	0	0%

Location	Water Year	#of samples	Median	90th Percentile	Max	Samples Exceeding 50ng/L	%>50	Samples Exceeding 100ng/L%	%>100	Samples Exceeding 80ng/L	%>80	Samples Exceeding 160ng/L	%>160
	2003	26	8	12	23	0	0%	0	0%	0	0%	0	0%
	2004	18	25	69	78	4	22%	0	0%	0	0%	0	0%
	2005	13	7	8	8	0	0%	0	0%	0	0%	0	0%
Sacramento River at Verona	2001	1	0	0	0	0	0%	0	0%	0	0%	0	0%
Sacramento River at Vina	1994	4	92	153	168	3	75%	2	50%	2	50%	1	25%
	2001	1	0	0	0	0	0%	0	0%	0	0%	0	0%
Sacramento Slough	1993	3	0	0	0	0	0%	0	0%	0	0%	0	0%
	1994	73	0	338	1,500	27	37%	20	27%	22	30%	13	18%
	1996	1	0	0	0	0	0%	0	0%	0	0%	0	0%
	1997	9	127	1,308	1,820	5	56%	5	56%	5	56%	4	44%
	1998	3	0	20	25	0	0%	0	0%	0	0%	0	0%
	1999	7	0	0	0	0	0%	0	0%	0	0%	0	0%
	2000	10	0	11	110	1	10%	1	10%	1	10%	0	0%
	2001	16	0	41	106	1	6%	1	6%	1	6%	0	0%
	2002	27	8	73	88	5	19%	0	0%	3	11%	0	0%
	2003	33	14	50	100	3	9%	0	0%	1	3%	0	0%
	2004	29	10	65	124	5	17%	1	3%	1	3%	0	0%
	2005	11	29	39	41	0	0%	0	0%	0	0%	0	0%
Stony Creek	2001	2	8	14	16	0	0%	0	0%	0	0%	0	0%
Sutter Bypass at Karnak	1997	8	41	53	56	2	25%	0	0%	0	0%	0	0%
	1998	5	0	78	88	2	40%	0	0%	1	20%	0	0%
	1999	6	73	98	110	4	67%	1	17%	2	33%	0	0%
	2000	14	0	50	93	2	14%	0	0%	1	7%	0	0%
	2001	9	52	112	132	5	56%	2	22%	2	22%	0	0%
Sutter Bypass at Kirkville Rd	1997	8	0	70	86	2	25%	0	0%	1	13%	0	0%
	1998	15	0	83	104	3	20%	1	7%	2	13%	0	0%
	1999	14	0	73	77	3	21%	0	0%	0	0%	0	0%

Location	Water Year	#of samples	Median	90th Percentile	Max	Samples Exceeding 50ng/L	%>50	Samples Exceeding 100ng/L%	%>100	Samples Exceeding 80ng/L	%>80	Samples Exceeding 160ng/L	%>160
	2000	8	0	0	0	0	0%	0	0%	0	0%	0	0%
Wadsworth Canal	1994	10	493	3,510	4,500	10	100%	10	100%	10	100%	10	100%
	1999	20	170	1,126	1,610	16	80%	15	75%	16	80%	11	55%
	2000	27	175	2,002	2,740	17	63%	15	56%	16	59%	14	52%
	2001	53	221	607	1,380	48	91%	40	75%	41	77%	34	64%
	2002	47	48	262	528	23	49%	15	32%	17	36%	10	21%
	2003	35	61	312	960	23	66%	10	29%	13	37%	7	20%
	2004	29	130	330	630	20	69%	17	59%	19	66%	9	31%
	2005	1	0	0	0	0	0%	0	0%	0	0%	0	0%
Yuba River at Marysville	1994	11	0	41	95	1	9%	0	0%	1	9%	0	0%
	2000	3	0	0	0	0	0%	0	0%	0	0%	0	0%
	2001	2	0	0	0	0	0%	0	0%	0	0%	0	0%
	2002	5	0	0	0	0	0%	0	0%	0	0%	0	0%
	2003	4	0	0	0	0	0%	0	0%	0	0%	0	0%
	2004	4	0	0	0	0	0%	0	0%	0	0%	0	0%

B2. Comparison of Chlorpyrifos Data to the Proposed Chlorpyrifos Objectives for Sample Locations within the Sacramento and Feather Rivers Watersheds

Location	Water Year	# of samples	Median	90th Percentile	Maximum	Samples Exceeding 15 ng/L	%>50	Samples Exceeding 25 ng/L	%>80
American River at Discovery Park	1999	1	0	0	0	0	0%	0	0%
	2003	14	0	0	0	0	0%	0	0%
Arcade Creek at Norwood Ave.	1996	1	27	27	27	1	100%	1	100%
	1997	24	7	30	45	6	25%	4	17%
	1998	5	18	24	24	3	60%	0	0%
	1999	6	0	0	0	0	0%	0	0%
	2000	10	0	4	40	1	10%	1	10%
	2001	7	0	0	0	0	0%	0	0%
	2002	5	0	0	0	0	0%	0	0%
	2003	4	0	0	0	0	0%	0	0%
	2004	3	0	520	650	1	33%	1	33%
Arcade Creek near Del Paso Heights	1996	1	27	27	27	1	100%	1	100%
	1997	23	7	31	44	6	26%	4	17%
	1998	5	18	24	24	3	60%	0	0%
	2001	16	2	8	9	0	0%	0	0%
	2002	11	0	9	16	1	9%	0	0%
	2003	13	5	20	22	2	15%	0	0%
	2004	11	0	6	21	1	9%	0	0%
	2005	20	2	11	24	1	5%	0	0%
Bear River	2000	2	0	0	0	0	0%	0	0%
Big Chico Creek	2001	4	0	0	0	0	0%	0	0%
	2002	2	0	0	0	0	0%	0	0%
	2003	3	0	0	0	0	0%	0	0%
Butte Creek	2000	3	0	0	0	0	0%	0	0%
Butte Slough	2000	3	0	0	0	0	0%	0	0%
	2002	7	0	0	0	0	0%	0	0%

Location	Water Year	# of samples	Median	90th Percentile	Maximum	Samples Exceeding 15 ng/L	%>50	Samples Exceeding 25 ng/L	%>80
	2003	17	0	2	5	0	0%	0	0%
Cherokee Canal	2000	1	0	0	0	0	0%	0	0%
Clarks Ditch	1992	3	0	0	0	0	0%	0	0%
Colusa Basin Drain	1994	3	9	17	19	1	33%	0	0%
	1996	1	0	0	0	0	0%	0	0%
	1997	16	0	13	16	1	6%	0	0%
	1998	5	0	0	0	0	0%	0	0%
	1999	7	0	0	0	0	0%	0	0%
	2000	12	0	0	0	0	0%	0	0%
	2001	7	0	280	700	1	14%	1	14%
	2002	5	0	0	0	0	0%	0	0%
	2003	22	0	0	8	0	0%	0	0%
	2004	18	0	4	12	0	0%	0	0%
	2005	11	0	0	0	0	0%	0	0%
Deer Creek	2001	4	0	0	0	0	0%	0	0%
	2002	2	0	0	0	0	0%	0	0%
	2003	3	0	0	0	0	0%	0	0%
Feather River at Oroville	2001	1	0	0	0	0	0%	0	0%
	2002	3	0	0	0	0	0%	0	0%
	2003	7	0	0	0	0	0%	0	0%
	2004	3	0	0	0	0	0%	0	0%
Feather River at Yuba City	2000	3	0	0	0	0	0%	0	0%
	2002	2	0	0	0	0	0%	0	0%
	2003	4	0	0	0	0	0%	0	0%
	2004	4	0	0	0	0	0%	0	0%
	2005	1	0	0	0	0	0%	0	0%
Feather River near Gridle	2002	3	0	0	0	0	0%	0	0%
	2003	2	0	0	0	0	0%	0	0%
	2004	1	0	0	0	0	0%	0	0%

Location	Water Year	# of samples	Median	90th Percentile	Maximum	Samples Exceeding 15 ng/L	%>50	Samples Exceeding 25 ng/L	%>80
Feather River near Olivehurst	1992	1	0	0	0	0	0%	0	0%
	2002	1	0	0	0	0	0%	0	0%
	2003	2	0	0	0	0	0%	0	0%
	2004	1	0	0	0	0	0%	0	0%
Feather River near outlet	1996	10	0	0	0	0	0%	0	0%
	1997	12	0	0	0	0	0%	0	0%
	1998	5	0	0	0	0	0%	0	0%
	2000	19	0	4	6	0	0%	0	0%
	2001	18	0	1	2	0	0%	0	0%
	2002	14	0	0	0	0	0%	0	0%
	2003	21	0	9	19	1	5%	0	0%
	2004	21	5	14	51	2	10%	1	5%
	2005	10	0	0	0	0	0%	0	0%
Gilsizer Slough	1992	5	0	0	0	0	0%	0	0%
	2000	5	0	0	0	0	0%	0	0%
	2004	2	0	0	0	0	0%	0	0%
	2005	1	0	0	0	0	0%	0	0%
Jack Slough	2000	3	0	0	0	0	0%	0	0%
	2002	2	0	0	0	0	0%	0	0%
Main Drainage Canal	2000	1	0	0	0	0	0%	0	0%
	2002	45	0	0	5	0	0%	0	0%
	2003	35	0	6	6	0	0%	0	0%
Mill Creek	2001	4	0	0	0	0	0%	0	0%
	2002	2	0	0	0	0	0%	0	0%
	2003	3	0	0	0	0	0%	0	0%
Natomas East Main Drain at DP	2003	24	0	8	11	0	0%	0	0%
	2004	4	0	0	0	0	0%	0	0%
Outside of Study area	2002	3	0	0	0	0	0%	0	0%
	2003	5	0	0	0	0	0%	0	0%

Location	Water Year	# of samples	Median	90th Percentile	Maximum	Samples Exceeding 15 ng/L	%>50	Samples Exceeding 25 ng/L	%>80
	2004	2	0	0	0	0	0%	0	0%
Sacramento Outfall	1994	1	10	10	10	0	0%	0	0%
Sacramento River above Bend Bridge	2000	1	0	0	0	0	0%	0	0%
	2001	1	0	0	0	0	0%	0	0%
Sacramento River at Alamar	1998	30	0	0	0	0	0%	0	0%
	1999	41	0	0	0	0	0%	0	0%
	2000	48	0	0	0	0	0%	0	0%
	2001	57	0	0	2	0	0%	0	0%
	2002	26	0	0	0	0	0%	0	0%
	2003	29	0	4	6	0	0%	0	0%
	2004	27	0	6	35	2	7%	1	4%
	2005	17	0	0	0	0	0%	0	0%
	2006	6	0	0	0	0	0%	0	0%
Sacramento River at Balls Ferry	2001	2	0	0	0	0	0%	0	0%
Sacramento River at Bryte	1997	24	0	0	0	0	0%	0	0%
Sacramento River at Colusa	1999	7	0	0	0	0	0%	0	0%
	2000	13	0	0	0	0	0%	0	0%
	2001	20	0	0	0	0	0%	0	0%
	2002	14	0	0	0	0	0%	0	0%
	2003	20	0	0	5	0	0%	0	0%
	2004	19	0	1	5	0	0%	0	0%
	2005	11	0	0	0	0	0%	0	0%
Sacramento River at Freeport	1996	1	0	0	0	0	0%	0	0%
	1997	16	0	0	3	0	0%	0	0%
	1998	11	0	0	0	0	0%	0	0%
	1999	18	0	0	0	0	0%	0	0%
	2000	15	0	2	6	0	0%	0	0%
	2001	19	0	0	0	0	0%	0	0%
	2002	23	0	0	4	0	0%	0	0%

Location	Water Year	# of samples	Median	90th Percentile	Maximum	Samples Exceeding 15 ng/L	%>50	Samples Exceeding 25 ng/L	%>80
	2003	20	0	0	4	0	0%	0	0%
	2004	17	0	5	12	0	0%	0	0%
	2005	22	0	6	8	0	0%	0	0%
	2006	6	0	0	0	0	0%	0	0%
Sacramento River at Hamilton City	1999	7	0	0	0	0	0%	0	0%
	2000	10	0	0	0	0	0%	0	0%
	2001	8	0	0	0	0	0%	0	0%
	2002	4	0	0	0	0	0%	0	0%
	2003	4	0	0	0	0	0%	0	0%
	2004	4	0	20	29	1	25%	1	25%
Sacramento River at Keswick	2001	1	0	0	0	0	0%	0	0%
Sacramento River at Red Bluff	2001	1	0	0	0	0	0%	0	0%
Sacramento River at Sacramento	1991	48	0	0	0	0	0%	0	0%
	1992	139	0	0	0	0	0%	0	0%
	1993	173	0	0	0	0	0%	0	0%
	1994	78	0	0	0	0	0%	0	0%
	1995	2	0	0	0	0	0%	0	0%
	2000	16	0	4	5	0	0%	0	0%
	2001	12	0	0	0	0	0%	0	0%
	2003	26	0	0	0	0	0%	0	0%
	2004	18	0	9	30	1	6%	1	6%
	2005	13	0	0	0	0	0%	0	0%
Sacramento River at Verona	2001	1	0	0	0	0	0%	0	0%
Sacramento River at Vina	2001	1	0	0	0	0	0%	0	0%
Sacramento Slough	1993	3	0	0	0	0	0%	0	0%
	1994	49	0	0	0	0	0%	0	0%
	1996	1	0	0	0	0	0%	0	0%
	1997	7	0	0	0	0	0%	0	0%
	1999	7	0	0	0	0	0%	0	0%

Location	Water Year	# of samples	Median	90th Percentile	Maximum	Samples Exceeding 15 ng/L	%>50	Samples Exceeding 25 ng/L	%>80
	2000	9	0	0	0	0	0%	0	0%
	2001	16	0	0	2	0	0%	0	0%
	2002	25	0	5	11	0	0%	0	0%
	2003	29	0	5	10	0	0%	0	0%
	2004	29	0	10	19	2	7%	0	0%
	2005	11	0	0	4	0	0%	0	0%
Sutter Bypass at Karnak	1997	8	0	0	0	0	0%	0	0%
	1998	5	0	0	0	0	0%	0	0%
	1999	6	0	0	0	0	0%	0	0%
	2000	14	0	0	0	0	0%	0	0%
	2001	23	0	0	0	0	0%	0	0%
Sutter Bypass at Kirkville Rd	1997	8	0	0	0	0	0%	0	0%
	1998	15	0	0	0	0	0%	0	0%
	1999	14	0	0	0	0	0%	0	0%
	2000	8	0	0	0	0	0%	0	0%
Wadsworth Canal	1999	20	0	0	0	0	0%	0	0%
	2000	22	0	0	0	0	0%	0	0%
	2001	24	0	0	0	0	0%	0	0%
	2002	45	4	22	123	7	16%	3	7%
	2003	35	9	17	30	5	14%	2	6%
	2004	29	10	20	28	10	34%	3	10%
	2005	1	0	0	0	0	0%	0	0%
Yuba River at Marysville	2000	1	0	0	0	0	0%	0	0%
	2001	2	0	0	0	0	0%	0	0%
	2002	5	0	0	0	0	0%	0	0%
	2003	4	0	0	0	0	0%	0	0%
	2004	4	0	0	0	0	0%	0	0%

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

AMENDMENTS TO THE WATER QUALITY CONTROL PLAN FOR THE SACRAMENTO RIVER AND SAN JOAQUIN RIVER BASINS

FOR

THE CONTROL OF DIAZINON AND CHLORPYRIFOS RUNOFF INTO THE SACRAMENTO AND FEATHER RIVERS

APPENDIX C

COST CALCULATIONS

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C1. Introduction

Appendix C contains tables showing the calculations used to determine the potential cost of implementing the proposed Basin Plan amendment, including implementation of management practices, monitoring and planning alternatives within the Sacramento and Feather Rivers. Existing data suggests that the Sacramento and Feather Rivers are meeting the proposed objectives and loading capacity or will be by the time this amendment is implemented. Additional reductions in diazinon loading are anticipated as a result of the new diazinon label and dormant spray regulations. As a result no additional management practices should be needed in either the dormant or irrigation seasons. To the extent additional expenses will be required in the irrigation season, they are accounted for in the high cost estimate.

Table C-1. Total Estimated Costs For the Implementing the Proposed Basin Plan Amendment

	Low Cost Estimate ($/yr)[1]	High Cost Estimate ($/yr)
Dormant Season Practices	0	0
Irrigation Season Practices (See Table C-3)	0	6,231,224
Monitoring and Planning Costs (See Tables C-4 and C-5)	341,364	1,489,296
Total	***341,364***	***7,720,520***

[1] Negative values indicate a cost savings.

Table C2 Cost Estimates for Implementation of Irrigation Season Management Practices (Based on cost estimates from Beaulaurier et al., 2005[2])

Crop	Crop Type	Acres Treated	% of Acres Applicable	Low Cost $/Acre	High Cost $/acre	Low Cost $/yr	High Cost $/yr
Walnut	Orchard	45,554	26	0	196	0	$2,416,172
Almond	Orchard	17,028	26	0	196	0	$903,167
Alfalfa	Field and row	9,122	100	0	100	0	$1,860,949
Plum (Fresh and Dried)	Orchard	3,691	26	0	196	0	$195,749
Cotton	Field and row	3,247	100	0	100	0	$337,667
Tomato	Field and row	3,152	100	0	100	0	$327,850
melon	Field and row	1,106	100	0	100	0	$114,993
Soybean	Field and row	243	100	0	100	0	$25,272
Grasses	Field and row	200	100	0	100	0	$20,800
Watermelon	Field and row	197	100	0	100	0	$20,436
Pecan	Orchard	154	26	0	196	0	$8,168
Total						***2,072,254***	***6,231,224***

[2] With cost corrections as documented in Landau, 2006.

Table C-3 Estimated Monitoring and Planning Costs for Watershed Group Compliance

Estimated Water Quality Monitoring Cost	
Number of Sites	8
Number of Environmental Samples (See Table C-5)	104
Total # of samples including 30% QA/QC Samples	135
Cost per Sample	$200
Total Analytical Costs	$27,040
Number of Toxicity Samples	56
Total Cost of Toxicity Analyses (assumes $1,000 per sample average cost)	$56,000
Number of Pyrethroid Samples	32
Total Cost of Pyrethroid Samples	$6,400
Number of Person-days for sample collection. Assumes 2 person crew can cover 6 sites.	35
Sample collection preparation as a percent of Person-days for sampling.	25%
Total Person-days for Sample Collection & Preparation	43
Cost per Person-day	$160
Sampling personnel cost	$6,880
Travel Costs (assumes each person day involves 300 miles of driving at $0.485 per mile based on 2007 IRS mileage reimbursement rate)	$5,044
Equipment/Supplies	$20,000
Monitoring Plan & Quality Assurance Plan (Assumes 1 person month @ $10,000 per person month)	$10,000
Monitoring Program Coordination (Assumes 1 year at 50% time at $10,000 per person month)	$60,000
Annual Monitoring Report	$30,000
Total Monitoring Cost	***$221,364***
Planning and Evaluation Cost	
Implementation Plan (Assumes 3 person months @ $10,000 per person month)	$30,000
Implementation Plan Coordination, Delta Watershed - Wide (assumes 12 mos at 50% time at $10,000 per person month)	$60,000
Annual Implementation Report, Including Practices Effectiveness Evaluation (Assumes 3 months at $10,000 per person month)	$30,000
Total Planning and Evaluation Cost	***$120,000***
Total annual cost for basin-wide monitoring, planning, and evaluation	
Total Cost	$341,364
Total Number of Growers	736
Cost per Grower	***$464***

Table C-4 Estimated Monitoring and Planning Costs for Individual Compliance

Water Quality Monitoring Cost	
Number of Tailwater Samples Collected per site	2
% QA/QC Samples	30%
Total # of samples	3
Cost per Sample	$200
Total analytical costs	$600
Cost for sampling collection and flow estimate (incl preparation and shipping). Assumes 2 hrs per sample @ $42/hr.	$168
Travel Costs (50 mi per trip/ $0.485 per mile.)	$49
Bottles and Supplies ($5/sample)	$15
Monitoring and Quality Assurance Plan. Assumes 8 hours time @ $42/hr	$336
Annual Monitoring Report (assume 8 hrs time @ $42/hr)	$336
Total Monitoring Cost per Site	***$1,664***
Planning and Evaluation Cost	
Implementation Plan (Assumes 4 hours @ $42 per person hour)	$168
Annual Implementation Plan Report Including Effectiveness Evaluation (Assumes 4 hours @ $42 per person hour)	$168
Total planning cost	***$336***
Total annual cost for basin-wide monitoring, planning, and evaluation	
Cost per Grower (assumes 1 monitoring site per grower)	$2,040
Total Number of Growers	736
Basin-wide Cost	***$1,501,072***

Table C-5. Estimated Number of Samples For Watershed-Based Compliance Monitoring

Locations	Sites	Storms	OP Samples per Storm	Storm OP Samples/Yr	Irrigation OP Samples/ Station	Irrigation OP Samples/Yr	Toxicity Samples/Yr	Pyrethroid Samples/Yr
Sacramento River at Hamilton City	1	1	7	7	6	6	7	4
Sacramento River at Colusa	1	1	7	7	6	6	7	4
Colusa Basin Drain	1	1	7	7	6	6	7	4
Sacramento River at Alamar	1	1	7	7	6	6	7	4
Sacramento River at Verona	1	1	7	7	6	6	7	4
Sacramento River at Sacramento (I Street)	1	1	7	7	6	6	7	4
Sacramento Slough	1	1	7	7	6	6	7	4
Feather River Near Outlet	1	1	7	7	6	6	7	4
Totals	***8***			***56***		***48***	***56***	***32***

Monitoring Rationale:

Watershed monitoring groups are already monitoring approximately twice per year to comply with the current basin plan amendment. However, by extending the Water Quality Objectives to include irrigation season Chlorpyrifos, one additional storm sample is recommended to account for high springtime chlorpyrifos use on alfalfa

7 days of sequential monitoring following storms is recommended to ensure that peak pesticide concentrations are captured, with sufficient data on bracketing days to determine a 4-day average concentration.

To ensure that alternatives to diazinon or chlorpyrifos are not causing surface water impairment, one toxicity sample per sampling event and quarterly sediment sampling for pyrethroids is recommended.

C2. Citations

Beaulaurier, D., G. Davis, J. Karkoski, M. McCarthy, D. McClure, M. Menconi. 2005. Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Diazinon and Chlorpyrifos Runoff into the Lower San Joaquin River.

Landau, K. 2006. Corrections To Basin Plan Amendment for the Control of Diazinon and Chlorpyrifos Runoff into the San Joaquin River. Memo from Ken Landau (Acting Executive Ofiicer, California Regional Water Quality Control Board, Central Valley Region) to Celeste Cantu (Executive Director, State Water Resources Control Board) dated January 26, 2006.

MANA. 2004. Supplemental Label, Diazinon 50W Insecticide, EPA Registration Number 66222-10. Makhteshim Agan of North America (MANA). New York, NY.

USDA 2004. Farm and Ranch Irrigation Survey (2003), Volume 2, Special Studies Part 1. U.S. Department of Agriculture. AC-02-SS-1. November 2004.

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

AMENDMENTS TO THE WATER QUALITY CONTROL PLAN FOR THE SACRAMENTO RIVER AND SAN JOAQUIN RIVER BASINS

FOR

THE CONTROL OF DIAZINON AND CHLORPYRIFOS RUNOFF INTO THE SACRAMENTO AND FEATHER RIVERS

APPENDIX D

CRITERIA CALCULATIONS FOR DIAZINON AND CHLORPYRIFOS

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D1. Water Quality Criteria Calculations

This section provides a detailed description of the calculations performed using the U.S. EPA's methodology (1985) for deriving aquatic life criteria. Diazinon criteria were derived using the toxicity datasets (**Table D-1**) identified as valid by the California Department of Fish and Game (CDFG) (Siepmann and Finlayson, 2000; Finlayson, 2004a) and by USEPA (2005). In performing the diazinon criteria calculations, the Gammarus fasciatus study results were removed from both of the CDFG and USEPA data sets, based on the recommendation of Finlayson (2004) and evaluation of the available Gammarus fasciatus data sheets by the Regional Board (CRWQCB-CVR, 2004). Calculations for the complete data set used by USEPA (2005) are also included. The data set used by USEPA (2005) includes Gammarus fasciatus acute toxicity values that were changed to a value an order of magnitude higher than originally reported. The chlorpyrifos criteria were derived using the toxicity dataset (**Table D-2**) identified as valid by the California Department of Fish and Game (Siepmann and Finlayson, 2000).

The USEPA methodology uses only the lowest four Genus Mean Acute Values (GMAVs) directly in the criteria derivation. The total number of GMAVs affects the percentile rankings of the lowest four GMAVs. **Table D-3** provides all of the intermediate calculations from application of the USEPA methodology to the four datasets. The intermediate calculations are rounded to four significant figures. The final criteria values are rounded to two significant figures. The number of significant figures for the intermediate values and final criteria follow the USEPA guidelines.

The Regional Board's calculations result in the same diazinon criteria as calculated by CDFG (Finlayson, 2004). The Regional Board's calculated chlorpyrifos criteria are slightly higher than the CDFG calculated acute criterion (0.025 v. 0.02 ug/L) and chronic criterion (0.015 v. 0.014 ug/L). The differences in the results are likely due to differences in rounding. CDFG rounded the final acute values (FAVs) of diazinon and chlorpyrifos to either one or two significant figures and the Regional Board rounded the FAVs to four significant figures.

Use of the USEPA diazinon data set versus CDFG's data set results in nearly identical FAVs and acute criterion (0.17 v. 0.16 ug/L, respectively). The four lowest GMAVs used by USEPA and CDFG were very similar. The associated percentile ranks were different, since U.S. EPA's data set included additional, less sensitive genera. The inclusion of data for a greater number of genera in the USEPA data set resulted in lower percentile ranks for the four lowest GMAVs, which makes the final criteria higher. The

inclusion of the questionable *Gammarus fasciatus* study results in the USEPA data set made no difference in the final results of the criteria calculations.

The difference in the chronic diazinon criterion calculated by USEPA and CDFG (0.17 v. 0.10 ug/L, respectively) is almost completely due to the use of different acute to chronic ratios (ACRs) – an ACR of 2 was used by USEPA and an ACR of 3 was used by CDFG. The ACR calculated by CDFG was preferred, since CDFG included three sensitive species in their calculation of the ACR (versus two by the US EPA contractor) and CDFG calculated ACRs based on toxicity test results from the same studies or at least the same laboratory.

Table D-1. Diazinon Genus Mean Acute Values Used by CDFG (Siepmann and Finlayson, 2000; Finlayson, 2004a) and USEPA (2005)

USEPA (2005) Data Set		**USEPA (2005) Data Set (excluding Gammarus fasciatus)**		**CDFG Data Set Siepmann and Finlayson, 2000; Finlayson, 2004a (excluding Gammarus fasciatus)**	
Genus Mean Acute Value (ug/L)	**Species**	**Genus Mean Acute Value (ug/L)**	**Species**	**Genus Mean Acute Value (ug/L)**	**Species**
0.3773	Ceriodaphnia dubia	0.3773	Ceriodaphnia dubia	0.44	Ceriodaphnia dubia
0.9020	Daphnia magna, Daphnia pulex	0.9020	Daphnia magna; Daphnia pulex	1.06	Daphnia magna, Daphnia pulex
1.587	Simocephalus serrulatus	1.587	Simocephalus serrulatus	1.59	Simocephalus serrulatus
5.858	Gammarus fasciatus[1], Gammarus pseudolimnaeus[2]	6.51	Hyalella azteca	4.15	Neomysis mercedis

Table continued on next page

[1] In response to the concerns about the questionable toxicity values reported for *Gammarus fasciatus* discussed above, the data set used by USEPA included *Gammarus fasciatus* acute toxicity values that were changed to a value an order of magnitude higher than originally reported (USEPA, 2006).

[2] CDFG found the *Gammarus pseudolimnaeus* study used by USEPA unacceptable for use in calculating water quality criteria because it did not meet ASTM standards for acute toxicity tests (Finlayson, 2004b).

Table D-1 (cont.). Diazinon Genus Mean Acute Values Used by CDFG (Siepmann and Finlayson, 2000; Finlayson, 2004a) and USEPA (2005)

6.51	Hyalella azteca	10.7	Chironomous tentans	4.41	Physa sp.
10.7	Chironomous tentans	16.82	Gammarus Pseudolimnaeus[2]	25	Pteronarcys californica
25	Pteronarcys californica	25	Pteronarcys californica	272	Lepomis macrochirus
>50	Rana clamitans	>50	Rana clamitans	441	Oncorhynchus clarki Oncorhynchus mykiss
459.6	Lepomis macrochirus	459.6	Lepomis macrochirus	660	Salvelinus fontinalis, Salvelinus namaycush
660	Salvelinus fontinalis Salvelinus namaycush	660	Salvelinus fontinalis Salvelinus namaycush	800	Poecilia reticulata
800	Poecilia reticulata	800	Poecilia reticulata	1,643	Jordanella floridae
960.4	Oncorhynchus clarki Oncorhynchus mykiss	960.4	Oncorhynchus clarki Oncorhynchus mykiss	7,804	Pimephales promelas
1,643	Jordanella floridae	1,643	Jordanella floridae	8,000	Brachydanio rerio
3,198	Pomacea paludosa	3,198	Pomacea paludosa	29,200	Brachionus calyciflorus
7,841	Lumbricus variegatus	7,841	Lumbricus variegatus		
8,000	Brachydanio rerio	8,000	Brachydanio rerio		
8,641	Pimephales promelas	8,641	Pimephales promelas		
9,000	Carassius auratus	9,000	Carassius auratus		
11,000	Gillia altilis	11,000	Gillia altilis		
11,640	Dugesia tigrina	11,640	Dugesia tigrina		

Table D-2. Chlorpyrifos Genus Mean Acute Values Used by Siepmann and Finlayson (2000)

Genus Mean Acute Value (ug/L)	Species
0.06	Ceriodaphnia dubia
0.11	Gammarus lacustris
0.15	Neomysis mercedis
0.38	Pteronarcella badia
0.54	Daphnia magna; Daphnia pulex
0.58	Claassenia sabulosa
0.60	Chironomus tentans
0.80	Petodytes sp.
3.03	Lepomis macrochirus
6.0	Orconectes immunis
10	Pteronarcys californica
10.1	Oncorhynchus clarki Oncorhynchus mykiss
138	Hyallela azteca
244	Salvelinus namaycush
274	Pimephales promelas
475	Ictalurus punctatus
>806	Carassius auratus
>806	Aplexa hypnorum

Table D-3. Results of Calculations Performed by the Regional Board on CDFG Diazinon and Chlorpyrifos Datasets and the U.S. EPA's Diazinon Data Set

Calculation Step	USEPA (2005) Diazinon Data Set	USEPA (2005) Diazinon Data Set (Excluding Gammarus Fascitaus)	CDFG Diazinon Data Set	CDFG Chlorpyrifos Data Set
Rank 1 Cumulative Probability (P) (GMAV- ug/L)	0.0476 (0.3773)	0.0476 (0.3773)	0.0667 (0.44)	0.0526 (0.06)
Rank 2 Cumulative Probability (P) (GMAV- ug/L)	0.0952 (0.9020)	0.0952 (0.9020)	0.1333 (1.06)	0.1053 (0.11)
Rank 3 Cumulative Probability (P) (GMAV- ug/L)	0.1429 (1.587)	0.1429 (1.587)	0.2000 (1.59)	0.1579 (0.15)
Rank 4 Cumulative Probability (P) (GMAV- ug/L)	0.1905 (5.858)	0.1905 (6.51)	0.2667 (4.15)	0.2105 (0.38)
S squared	149.9	162.0	70.21	60.77
S	12.24	12.73	8.379	7.796
L	-3.816	-3.954	-3.043	-4.72
A	-1.079	-1.107	-1.169	-2.977
Final Acute Value(ug/L)	0.3399	0.3305	0.3107	0.0509
Acute Criterion (ug/L)	0.17	0.17	0.16	0.025
Acute to Chronic Ratio	2	2	3	3.5
Final Chronic Value (ug/L)	0.1700	0.1653	0.1036	0.01454
Chronic Criterion (ug/L)	0.17	0.17	0.10	0.015

The calculation steps are defined below. The cumulative probability (P) and associated GMAVs of the lowest four GMAVs are applied in the equations below.

$$S^2 = \frac{\sum((\ln GMAV)^2) - \frac{(\sum(\ln GMAV))^2}{4}}{\sum(P) - \frac{((\sum(\sqrt{P}))^2}{4}} \qquad \textit{(Eq. D-1)}$$

$$L = \frac{\Sigma(\ln GMAV) - S \cdot \Sigma(\sqrt{P})}{4} \qquad \textit{(Eq. D-2)}$$

$$A = S(\sqrt{0.05}) + L \qquad \textit{(Eq. D-3)}$$

$$FAV = e^A \qquad \textit{(Eq. D-4)}$$

where:

The Genus Mean Acute Value (GMAV) is the geometric mean of all species mean acute values (SMAVs) for each genus; the SMAV is the geometric mean of all EC_{50} and LC_{50} values for a species.

The GMAVs are ranked (R) from "1" for the lowest to "N" for the highest; identical GMAVs are arbitrarily assigned successive ranks; and

The cumulative probability (P) is calculated for each GMAV as R/(N+1)

The Acute Criterion (Criteria Maximum Concentration) is the Final Acute Value divided by two.

The Chronic Criterion (Criteria Continuous Concentration) is the Final Acute Value divided by the Acute to Chronic Ratio.

D2. Relative Potency Factor Calculations

The calculation of a "relative potency factor" (RPF) follows the recommendation of Felsot (2005). The purpose of determining an RPF is to normalize the relative potency (or toxicity) of two or more chemicals. In this case, the RPF is calculated to determine the relative toxicity of chlorpyrifos to diazinon. By multiplying the ambient diazinon concentration by the RPF, the diazinon concentrations are normalized to a concentration of chlorpyrifos that would be equivalent in terms of toxicity.

The RPF is expressed in terms of the "Final Acute Value" (FAV) and "Final Chronic Value" (FCV)[3]. The RPF based on the FAV is the Acute Relative Potency Factor (ARPF). The RPF based on the FCV is the Chronic Relative Potency Factor (CRPF).

$$\text{ARPF}_{\text{(chlorpyrifos/diazinon)}} = \frac{\text{FAV}_{\text{chlorpyrifos}}\ \text{(ug/L)}}{\text{FAV}_{\text{diazinon}}\ \text{(ug/L)}} \qquad \textit{(Eq. D-5)}$$

$$\text{CRPF}_{\text{(chlorpyrifos/diazinon)}} = \frac{\text{FCV}_{\text{chlorpyrifos}}\ \text{(ug/L)}}{\text{FCV}_{\text{diazinon}}\ \text{(ug/L)}} \qquad \textit{(Eq. D-6)}$$

$$FCV = \frac{FAV}{ACR} \quad \textit{where the ACR is the "acute to chronic" ratio.} \qquad \textit{(Eq. D-7)}$$

Substituting **Equation D-7** into **Equation D-6** gives:

$$CRPF_{(chlorpyrifos/diazinon)} = \frac{FAV_{chlorpyrifos} * ACR_{diazinon}}{FAV_{diazinon} * ACR_{chlorpyrifos}} \qquad \textit{(Eq. D-8)}$$

Substituting the values in **Table D-3** into **Equations D-5** and **D-8**, respectively, gives:

$$ARPF_{(chlorpyrifos/diazinon)} = \frac{0.0509(ug/L)}{0.3107(ug/L)} = 0.1638 \qquad \textit{(Eq. D-9)}$$

$$CRPF_{(chlorpyrifos/diazinon)} = \frac{0.0509(ug/L)*3}{0.3107(ug/L)*3.5} = 0.1404 \qquad \textit{(Eq. D-10)}$$

[3] Note that although Felsot (2005) focused on the acute criteria or endpoints, the approach can also be applied to chronic criteria or endpoints.

D3. Comparison of the "Toxic Equivalents" Calculation Method and the Basin Plan's Method for Considering Additive Toxicity

The section presents the two methodologies considered in establishing the loading capacity of the Sacramento and Feather Rivers for inputs of diazinon and chlorpyrifos. The "Toxic Equivalents" method (**Equation D-12**) is shown to produce the same conclusion regarding attainment of applicable objectives as the method found in the Basin Plan (**Equation D-11)**.

The Basin Plan approach is:

$$\frac{C_{diazinon}}{O_{diazinon}} + \frac{C_{chlorpyrifos}}{O_{chlorpyrifos}} = S \leq 1 \qquad \textit{(Eq. D-11)}$$

Where:

$C_{diazinon}$ = *ambient diazinon concentration*

$C_{chlorpyrifos}$ = *ambient chlorpyrifos concentration*

$O_{diazinon}$ = *diazinon water quality objective or criteria*

$O_{chlorpyrifos}$ = *chlorpyrifos water quality objective or criteria*

The Toxic Equivalents approach is:

$$ChlorTEQ = C_{diazinon} * RPF_{(chlorpyrifos/diazinon)} + C_{chlorpyrifos} \leq O_{chlorpyrifos} \qquad \textit{(Eq. D-12)}$$

Where:

$$RPF_{(chlorpyrifos/diazinon)} = \frac{FAV_{(chlorpyrifos)}}{FAV_{(diazinon)}} \qquad \textit{(Eq. D-13)}$$

Multiplying both sides of **Equation D-11** by "$O_{chlorpyrifos}$" yields:

$$C_{diazinon} * \frac{O_{chlorpyrifos}}{O_{diazinon}} + C_{chlorpyrifos} \leq O_{chlorpyrifos} \qquad \textit{(Eq. D-14)}$$

Using the USEPA methodology for deriving acute criteria:

$$O_{chlorpyrifos} = \frac{FAV_{chlorpyrifos}}{2} \qquad \textit{(Eq. D-15)}$$

$$O_{diazinon} = \frac{FAV_{diazinon}}{2} \qquad \textit{(Eq. D-16)}$$

Substituting **Equations D-15** and **D-16** into the left hand side of **Equation D-14** gives:

$$C_{diazinon} * \frac{FAV_{chlorpyrifos}}{FAV_{diazinon}} + C_{chlorpyrifos} \leq O_{chlorpyrifos} \qquad \textit{(Eq. D-17)}$$

Substituting **Equation D-13** into **Equation D-17** gives:

$$C_{diazinon} * RPF_{(chlorpyrifos/diazinon)} + C_{chlorpyrifos} \leq O_{chlorpyrifos} \qquad \textit{(Eq. D-18)}$$

Equation D-11 (the Basin Plan approach) has been shown to be the same as **Equation D-12** (the "Toxic Equivalents" approach).

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CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

AMENDMENTS TO THE WATER QUALITY CONTROL PLAN FOR THE SACRAMENTO RIVER AND SAN JOAQUIN RIVER BASINS

FOR

THE CONTROL OF DIAZINON AND CHLORPYRIFOS RUNOFF INTO THE SACRAMENTO AND FEATHER RIVERS

APPENDIX E

PEER REVIEW EVALUATION

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TO: Gerald W. Bowes, Ph.D.,
Staff Toxicologist (Sup.)
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Division of Water Quality
State Water Resources Control Board

FROM: Ken Landau
Assistant Executive Officer
Regional Water Quality Control Board, Central Valley Region

SIGNATURE:

DATE: 9 November 2006

SUBJECT: EVALUATION OF NEED FOR SCIENTIFIC PEER REVIEW OF THE SACRAMENTO AND FEATHER RIVERS DIAZINON AND CHLORPYRIFOS BASIN PLAN AMENDMENT

This memo serves to document Regional Water Quality Control Board, Central Valley Region (Central Valley Water Board) staff's understanding of the applicability of, and compliance with, Health and Safety Code Section 57004 (HSC 57004) peer review requirements as it pertains to the proposed Basin Plan Amendment to Control Discharges of Diazinon and Chlorpyrifos into the Sacramento and Feather Rivers (the Proposed Amendment). This memo replaces the memo dated 27 October 2006, which we previously sent to you. We had mistakenly indicated that the USEPA guidance was "generally" followed in the proposed and the previous Amendments. In fact, the US EPA Guidance for calculating aquatic life criteria was strictly followed.

Background:

In 2003, the Central Valley Water Board issued resolution R5-2003-0148, which approved a Basin Plan Amendment establishing diazinon water quality objectives, total maximum daily loads (TMDLs) and implementation plans for diazinon in the Sacramento and Feather Rivers (Original Amendment). The Original Amendment was peer reviewed and staff responded to peer review comments in accordance with HSC 57004 requirements. The Original Amendment has been approved by the State Water Resources Control Board (State Water Board), the Office of Administrative Law (OAL) and the US EPA, and serves as the baseline language for the Proposed Amendment.

The Original Amendment included the requirement to review the diazinon allocations and the implementation provisions in the Basin Plan at least once every 5 years, beginning no later than June 30, 2007. The Proposed Amendment is being prepared to meet this review requirement and respond to a Superior Court Order. The Proposed Amendment also has the goal to establish programmatic consistency between watersheds by establishing water quality objectives and implementation plans for chlorpyrifos in addition to diazinon.

Since approval and adoption of the Original Amendment, new information has been provided to Central Valley Water Board staff that calls into question some of the data used to establish the diazinon water quality objectives. The Original Amendment adopted the California Department of Fish and Game (CDFG) diazinon criteria as the water quality objective. The new information showed that the dataset used by CDFG included a toxicity value that was incorrectly reported in the literature. Central Valley Water Board staff recalculated the diazinon objectives using a corrected dataset that excluded the questionable data point. After correction, the new water quality objectives are approximately twice the original objectives.

In 2005 and 2006, the Central Valley Water Board adopted two other Basin Plan amendments that are relevant to the current project. In 2005, the Central Valley Water Board issued resolution R5-2005-0138 to control diazinon and chlorpyrifos in the San Joaquin River (the San Joaquin River Amendment). In 2006, the Central Valley Water Board issued resolution R5-2006-0061 to control diazinon and chlorpyrifos in the Sacramento-San Joaquin Delta (the Delta Amendment). Both Amendments adopted the new diazinon water quality objectives, calculated using the corrected data set.

The San Joaquin River Amendment has been approved by the State Water Board and OAL and is currently awaiting approval by the US EPA. The Delta Amendment is awaiting approval by the State Water Board, OAL and the US EPA. Both amendments were peer reviewed, and included staff response to peer review comments, in accordance with HSC 57004. Work performed and peer reviewed under these amendments, as well as work performed as part of the Original Amendment, has been applied to the Sacramento and Feather Rivers as part of the Proposed Amendment.

Legal Basis for Peer Review

According to the Health and Safety Code, section 57004(d):

> *"No board, department, or office within the agency shall take any action to adopt the final version of a rule unless [the Board] submits the scientific portions of the proposed rule, along with a statement of the scientific findings, conclusions, and assumptions on which the scientific portions of the proposed rule are based and the supporting scientific data, studies, and other appropriate materials, to the external scientific peer review entity for its evaluation."*

The State Water Board Administrative Procedures Manual (APM) Section 8, III.D. clarifies that

> *"Peer review is not needed for source documents that have been previously peer reviewed by a recognized expert or body of experts.*

In addition the Peer Review Guidance (Bowes 2004) clarifies that:

> *"There are several circumstances where work products do not require review peer review under [HSC 57004], including:*

A particular work product that has been peer reviewed with a known record by a recognized expert or expert body. Additional peer review is not required if a new application of an adequately peer reviewed work product does not depart significantly from its scientific approach."

Evaluation of Need for Peer Review

Table 1 provides a list of the scientific elements of the Proposed Amendment and identifies the previous amendments that were used as sources in developing the Proposed Amendment. All of the previous Basin Plan amendments qualify as source documents that have been previously peer reviewed by a recognized expert or body of experts. As such, scientific portions of the Proposed Amendment and aspects of its scientific basis have been through a complete peer review process in accordance with HSC 57004.

TABLE 1
SUMMARY OF PEER REVIEW OF SCIENTIFIC BASIS OF BASIN PLAN AMENDMENT ELEMENTS

Proposed Amendment Element	Proposed Approach	Prior Scientific Peer Review
Diazinon and Chlorpyrifos Water Quality Objectives	Adopt diazinon and chlorpyrifos water quality objectives derived by staff using the US EPA methodology and the revised CDFG dataset	• San Joaquin River Amendment • Delta Amendment
Loading Capacity	Additivity formula sums the ratios of the concentration of each pesticide to their respective water quality objectives. Sums greater than one exceed the narrative toxicity objective.	• San Joaquin River Amendment • Delta Amendment
Allocation methodology	Allocations are set equal to the loading capacity	• San Joaquin River Amendment • Delta Amendment
Monitoring	Add chlorpyrifos as a pesticide that must be included in a monitoring program	• San Joaquin River Amendment • Delta Amendment • Original Amendment

In addition to relying on the previously peer reviewed Basin Plan amendments as source documents, the Proposed Amendment also utilized the same scientific approach. The following is a list of elements of the Proposed Amendment and how the scientific approach is equivalent to the previously peer reviewed Basin Plan amendments.

1. Diazinon and chlorpyrifos water quality objectives.

The US EPA methodology for deriving criteria, used in the Original Amendment and also in the San Joaquin River and Delta Amendments, has been applied to the Proposed Amendment. The recommended diazinon and chlorpyrifos water quality objectives for the Proposed Amendment are based on a recalculation of the California Department of Fish and Game's (CDFG) diazinon and chlorpyrifos water quality criteria (Siepmann and Finlayson, 2000). Central Valley Water Board staff followed the US EPA guidance on the derivation of criteria for the protection of aquatic life (USEPA, 1985). The water quality objectives for the Proposed Amendment are identical to the

Delta and San Joaquin River objectives. As with the San Joaquin River and Delta Amendments, the CDFG criteria were recalculated to utilize a revised dataset and to express the criteria to two significant figures, consistent with the USEPA guidance. As with the San Joaquin River and Delta Amendments, the frequency with which the criteria can be exceeded has been changed from the USEPA guidance recommendation of once every three years on the average to once every three-year period to simplify evaluation of compliance.

2. Loading capacity

The approach to setting the loading capacity used in the San Joaquin River and Delta Amendments is also proposed for the Sacramento and Feather Rivers. Specifically, the Proposed Amendment sets the loading capacity equal to the existing additive formula, which accounts for the additive effects of chemicals with the same mode of action. The formula sums the ratios of the concentration of each pesticide in the water body to the applicable objective for that pesticide. A sum of greater than one (1) indicates that applicable narrative objectives are not met. The additive formula is applied to both the loading capacity and allocations (i.e. the sum of the ratio of the concentrations). This is the identical approach that was taken with the San Joaquin and Delta Amendments.

3. Allocation methodology

Allocations are proposed to be set equal to the loading capacity. This approach is identical to the peer reviewed approach used in the San Joaquin River and Delta Amendments.

4. Monitoring

The current Basin Plan as amended by the Original Amendment defines goals for required monitoring to determine whether the water quality objectives and load allocations are being met. The only proposed change in the Proposed Amendment compared to the Original Amendment is the policy decision to explicitly include chlorpyrifos as one of the pesticides to monitor. The recommended approach has been peer reviewed in the Original Amendment and in the San Joaquin and Delta Amendments.

Conclusion

Based on Staff's understanding of HSC 57004 and APM Section 8, III. D., staff has determined that the scientific portions and scientific basis of the Proposed Amendment to control discharges of diazinon and chlorpyrifos into the Sacramento and Feather Rivers are based on source material that has already been peer reviewed. The Proposed Amendment is itself just a new application of earlier, adequately peer reviewed work products. As shown above, it does not depart from the scientific approach of the other Basin Plan Amendments from which it is derived. Therefore, the Proposed Amendment has already satisfied the peer review requirement of HSC 57004 and, therefore, does not require additional peer review.

Should you have any comments or questions about this assessment, please contact either Paul Hann at (916) 464-4628 or phann@waterboards.ca.gov or Joe Karkoski at (916) 464-4668 or jkarkoski@waterboards.ca.gov.

References:

Beaulaurier, D., G. Davis, J. Karkoski, M. McCarthy, D. McClure, M. Menconi. 2005. Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Diazinon and Chlorpyrifos Runoff into the Lower San Joaquin River. California Regional Water Quality Control Board, Central Valley Region. Sacramento, CA.

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Siepmann, S. and B.J. Finlayson. 2000. Water quality criteria for diazinon and chlorpyrifos. California Department of Fish and Game. Office of Spill Prevention and Response Administrative Report 00-3. Sacramento, CA.

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Linda S. Adams
Secretary for
Environmental Protection

State Water Resources Control Board

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Arnold Schwarzenegger
Governor

TO: Ken Landau
Assistant Executive Officer
Central Valley Regional Water Board

Gerald W. Bowes

FROM: Gerald W. Bowes, Ph.D., Manager
Toxicology and Peer Review Section
Division of Water Quality

DATE: November 20, 2006

SUBJECT: EVALUATION OF NEED FOR SCIENTIFIC PEER REVIEW OF THE PROPOSED SACRAMENTO AND FEATHER RIVERS DIAZINON AND CHLORPYRIFOS BASIN PLAN AMENDMENT

This memorandum responds to your November 9, 2006 communication on the subject above. Your staff has concluded that the proposed Basin Plan Amendment does not have to be submitted for external scientific peer review, which normally is a requirement of Health and Safety Code Section 57004 for proposed rules. According to staff, the scientific approach is identical to that employed in two other peer reviewed Basin Plan Amendments adopted in the last two years by your Board for the same two organophosphorous pesticides. These are referred to as the "San Joaquin River Amendment" and the "Delta Amendment."

As noted in your memorandum, one of the circumstances where work products may not be subject to external peer review is when it has been "peer reviewed previously with a known record by a recognized expert or expert body". . . and "does not depart significantly from its scientific approach." This clarification appears in the peer review guidelines for the State and Regional Water Boards, as you noted. It is based on text that appears in the following document: Unified California Environmental Protection Agency. Policy and Guiding Principles for External Scientific Peer Review. March 13, 1998.

I also talked with your staff. Based on these discussions and the information provided in your letter, I conclude that the proposed Basin Plan Amendment does not have to be submitted for external peer review. The basis for my conclusion follows. If any of this is not accurate, please let me know and we will discuss the matter further.

Water Quality Objectives

1. The "original" 2003 Basin Plan Amendment (for which the proposed amendment is an update) established water quality objectives, TMDLs, and an implementation plan for diazinon in the Sacramento and Feather Rivers. Chlorpyrifos was not included in the original Amendment.
2. Subsequent to adoption of the original Basin Plan Amendment, new information about the dataset that was used to establish criteria (and, subsequently objectives) for diazinon showed that it contained some incorrect information. The corrected criteria were approximately twice the original values, as noted in your letter.
3. In 2005 and 2006, the Central Valley Water Board adopted two additional Basin Plan Amendments that included water quality objectives for diazinon. These are the "San Joaquin River Amendment," and the "Delta Amendment," referred to above. The corrected, higher values for diazinon were used in these amendments. Before adoption, each of the two amendments was submitted for external peer review, following the requirements of Health and Safety Code Section 57004. The rationale for establishing the diazinon objectives based on the higher criteria was reviewed and accepted by the reviewers.
4. The San Joaquin River Amendment and the Delta Amendment also included objectives for chlorpyrifos. The proposed chlorpyrifos objectives were reviewed and accepted by the external reviewers.

Implementation of Water Quality Objectives

1. Loading Capacity. The approach for determining loading capacity for diazinon and chlorpyrifos for the proposed Sacramento and Feather Rivers Basin Plan Amendment is the same as that used for the San Joaquin River Amendment and the Delta Amendment. This is based on a formula which "sums the ratios of the concentration of each pesticide in the water body to the applicable objective for that pesticide. A sum of greater than one (1) indicates that the applicable narrative objectives are not met."
2. Allocation Methodology. "Allocations are proposed to be set equal to the loading capacity." Again, this methodology is stated to be identical to the one employed in the San Joaquin River and Delta Amendments.
3. Monitoring. The original Amendment did not include chlorpyrifos, but the proposed Amendment includes both diazinon and chlorpyrifos. The monitoring strategy is identical to that in the San Joaquin River and Delta Amendments.

With respect to (1) Loading Capacity, (2) Allocation Methodology, and (3) Monitoring, I assume that the external peer reviewers have concurred with the approaches taken for all the Amendments referred to. However, as you are aware, Health and Safety Code

Section 57004 allows flexibility in responding to a reviewer's comment which may be critical of a certain part of the proposed rule's scientific basis. The organization requesting review of its proposed rule may change the proposal to conform to a reviewer's recommendation, or it may choose not to. In the latter circumstance, the organization requesting peer review must demonstrate why its approach is based on sound scientific principles. If the latter course of action was taken for any scientific component in the San Joaquin River Amendment and the Delta Amendment, or for the proposed Amendment, Health and Safety Code Section 57004 states the following: [the Cal/EPA organization] "shall explain, and include as part of the rulemaking record, its basis for arriving at such a determination in the adoption of the final rule, including the reasons why it has determined that the scientific portions of the proposed rule are based on sound scientific knowledge, methods, and practices." This determination and supporting rationale also would have to be brought to the attention of the Board at the time the proposed Amendment is adopted. In adopting the proposed Amendment, the Board would be concurring with staff's rationale.

The proposed Amendment does not appear to contain any new scientific components compared to the San Joaquin River and Delta Amendments.

If you have any questions concerning the above, please contact me at (916) 341-5567 (gbowes@waterboards.ca.gov).

cc: Frances McChesney, OCC

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

AMENDMENTS TO THE WATER QUALITY CONTROL PLAN FOR THE SACRAMENTO RIVER AND SAN JOAQUIN RIVER BASINS

FOR

THE CONTROL OF DIAZINON AND CHLORPYRIFOS RUNOFF INTO THE SACRAMENTO AND FEATHER RIVERS

APPENDIX F

RESPONSE TO SCOPING COMMENTS

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The following presents the comments received as of the writing of this report. Comment letters were submitted in response to the May 2006 and February 2007 CEQA Scoping Meetings. Any additional comments received in response to the February 2007 Scoping Meeting will be incorporated into the response to public review of the Staff Report. Central Valley Water Board responses follow each comment.

1. John S. Sanders, Ph.D., Chief, Environmental Monitoring Branch, Department of Pesticide Regulation

Comment 1-1: The Central Valley Water Board should consider how DPR may help achieve Regional Board goals related to pesticides and water quality.

Response 1-1: The Central Valley Water Board is greatly appreciative of DPR's efforts to re-evaluate both diazinon and chlorpyrifos based on their water quality impact. We also appreciate DPR's proactive regulation of dormant sprays to address potential alternatives to diazinon and chlorpyrifos. We believe these DPR efforts have worked in a complimentary fashion with our water quality programs. We intend to continue to consult with DPR to identify areas in which we can work together. The consistency of this project to the MAA is discussed in the Staff Report Policy Section (Section 7.0). Sections 6.0 and 9.0 discuss the role that DPR policies, specifically the new dormant spray regulations will play in achieving and maintaining compliance with the proposed Water Quality Objectives and Loading Capacity.

Comment 1-2: The Regional Board should consult with DPR throughout the development of these Basin Plan Amendments. This recommendation is in keeping with DPR's management agency agreement (MAA) with the State Water Resources Control Board (State Board), in which DPR agreed to work cooperatively with the State and Regional Boards during the development and implementation of regulatory programs that address the effects of pesticides on water quality. It is plausible that if new numeric water quality objectives for diazinon are adopted by the Regional Board, the implementation plans can recognize DPR's commitment to be the Regional Board's regulatory partner. This may lessen the need for the Regional Board to actively regulate pesticide discharges and instead rely on DPR's authorities over pesticide sales and use to control pesticide discharges.

Response 1-2: The Staff Report recognizes DPR's efforts to regulate dormant spray pesticide use. In addition, the Central Valley Water Board's existing policy allows dischargers to rely on existing state or federal pesticide regulatory requirements in the management plan they submit to the Board.

2. Kerry Schmitz, Senior Civil Engineer, Sacramento County Stormwater Program

Comment 2-1: We specifically endorse the consideration of revised water quality objectives for diazinon within the current process. Based on the technical merits, we support adoption of the revised (recalculated) CA DF&G objectives for diazinon, as incorporated within both the 2005 the San Joaquin River Pesticides TMDL/BPA and the proposed Sacramento/San Joaquin River Delta Pesticides TMDL/BPA. These objectives are higher than those previously adopted for the Sacramento/Feather River diazinon TMDL/BPA.

In the interest of both technical validity and regulatory consistency, we recommend that the diazinon water quality objectives and loadings in the Sacramento/Feather River TMDL be adjusted to conform to standards established for the San Joaquin River and proposed for the Sacramento/San Joaquin River Delta. This would result in acute and chronic objectives of 160 ng/L and 100 ng/L, respectively.

Response 2-1: The Staff Report recommends diazinon acute and chronic objectives of 160 ng/L and 100 ng/L. In addition, the Staff Report recommends chlorpyrifos objectives and loading capacities consistent with the Delta and San Joaquin River Basin Plan Amendments.

Comment 2-2: The Implementation Provisions should be amended to explicitly recognize that pesticide regulation by CalEPA and U.S. EPA are critical for controlling pesticide discharges in the watershed . They should also recommend that CalEPA and U.S. EPA make improvements in the pesticide regulatory process, to better prevent or mitigate water quality impacts, through efforts such as risk assessment, pesticide registration, re-registration, and re-evaluation. Please refer to examples of such recommendations within the Implementation Plan for the WQAS/TMDL for Control of Diazinon and Pesticide-Related Toxicity in Bay Area Creeks, SF Bay Regional Water Quality Control Board (Nov., 2005).

Response 2-2: A review of policies and regulations that apply to the control of diazinon and chlorpyrifos is included in Section 7.0 of the Staff Report. U.S. EPA has acted to address environmental issues associated with diazinon and chlorpyrifos through the 2000 and 2001 Risk Assessments and Agreements with Registrants (U.S. EPA 2000; U.S. EPA 2001). These agreements resulted in changes to the diazinon and chlorpyrifos pesticide use registrations to phase out all outdoor non-agricultural uses of diazinon and nearly all indoor and outdoor residential uses chlorpyrifos. As a result of these regulatory changes, no additional mitigation measures should be required to address urban discharges of diazinon and chlorpyrifos. In addition, DPR has issued new dormant spray regulations to address diazinon and chlorpyrifos discharges in the dormant spray season. DPR has also put diazinon and chlorpyrifos into re-evaluation. Based on the EPA and DPR efforts, we do not believe it is necessary to expand the scope to address the general pesticide regulatory process.

3. William J. Thomas, Jr., Best, Best & Kreiger, LLP

Comment 3-1: There is a marked lack of appropriate process by attempting to inject, at the midnight hour, chlorpyrifos into a TMDL that has been under development for a couple of years and has engaged many stakeholder interests that have an interest in Diazinon. None of that has involved chlorpyrifos or folks who have stakeholder interests in chlorpyrifos. Chlorpyrifos is due the same procedural process clarity and input opportunities as was afforded to Diazinon and would be afforded to any other chemical for which a new TMDL is proposed.

Response 3-1: The Central Valley Water Board has managed this project in accordance with the relevant regulations, including all notification and consultation requirements. An initial CEQA scoping meeting was held in May

2006. Once Chlorpyrifos was added to the project scope a second CEQA Scoping meeting was scheduled. The Public Notification was issued in December 2006, nearly 6 months prior to the anticipated date of the Board hearing. At the scoping meeting, held on 15 February 2007, a complete description of the proposed Amendment was provided. The presentation materials for both scoping meetings are available through the Central Valley Water Board's website at:

http://www.waterboards.ca.gov/centralvalley/programs/tmdl/sac_feather_diaz/index.html

A third public workshop, on 2 April 2007 has been scheduled to discuss the staff report. Comments on the proposed Amendment have been requested at every workshop. A final opportunity to comment will be provided at the board hearing, scheduled for 3,4 May 2007.

It should be noted that the proposed Amendment is identical to the Delta and San Joaquin River Amendments, with respect to the TMDL elements and chlorpyrifos objectives. The commenter has provided comments on those two Amendments, and is therefore very familiar with the substantive TMDL and Water Quality Objective elements of this Amendment.

> **Comment 3-2**: All elements of the earlier TMDLs were worked out, understood, and agreed to with the narrow exception of the additivity formula being applied when one of the two chemicals is only present at such a low concentration that it would have no biological influence. We continue to assert that position which is embraced by the scientific community and even your peer reviewers.

Response 3-2: The additivity issue to which the commenter refers, appeared as a peer review comment (Felsot, 2005) on the San Joaquin River OP Pesticide Basin Plan Amendment (Beaulaurier et al., 2005). The peer reviewer stated that the Basin Plan's additivity formula, proposed for use in the San Joaquin Amendment did not reflect additive toxicity. The peer reviewer suggested an alternative method for calculating additive toxicity. Staff reviewed this comment and determined that that the alternative method recommended by the peer reviewer is mathematically equivalent to the Basin Plan formula for additive toxic effects of pesticides (Beaulaurier et al., 2005, McClure et al., 2006). This demonstration is discussed in Section 6.0 and has been reproduced in Appendix D. In addition, staff noted that the purpose of the additivity formula is not to

predict a given level at which impairment of beneficial uses might occur, but to identify a protective level below which no adverse effect would be expected, consistent with the legal mandate of the Board (Beaulaurier et al., 2005). The recommendation for the San Joaquin River Amendment, which was also adopted as part of the Delta Amendment, was to continue using the existing Basin Plan's additivity equation. Subsequent reviews of the Delta Amendment by Dr. Felsot (2006) concurred with the Board's decision.

No scientific evidence has been provided to support this suggestion that chlorpyrifos can be ignored at low levels when other organophosphorous pesticides are present. In fact, studies by Deener et al. (1988) suggest that there is no such threshold for chemicals with a similar mode of action.

As noted in Response 3-1 above, the proposed Amendment is identical to the Delta and San Joaquin River Amendments with respect to the TMDL elements and chlorpyrifos objectives. The issues and available scientific information are the same as what was reviewed and approved by the Central Valley Water Board as part of both the San Joaquin River and the Delta Amendments (Beaulaurier et al., 2005; McClure et al., 2006). The proposed Amendment is based on science that has already been peer reviewed and commented on by the public through earlier Amendments. The Central Valley Water Board has reviewed those peer review comments and staff responses and concurrent with the scientific basis for the amendment. The Proposed Amendment is simply a new application of earlier work products and does not depart from the scientific approach of previous basin plan Amendments.

> **Comment 3-3:** The water boards deemed that there is not a sufficient basis to create a TMDL for chlorpyrifos on the Sacramento, but you (wrongfully) contend that you do have sufficient data to justify a TMDL for chlorpyrifos on the Feather River.

Response 3-3: The State Water Resources Control Board was the lead agency for the most recent 303d list. The Central Valley Water Board was provided an opportunity to comment, as were all interested stakeholders. However the final listing decision did not rest with the Central Valley Water Board. The State Board approved the final listing decision on 25 October 2006 through Resolution number 2006 – 0079. The U.S. EPA reviewed the current 303d list and issued a letter of approval on 30 November 2006 (Strauss, 2006).

Once the Feather River was included on the impaired waters list, Section 303d of the Clean Water Act Requires that

> *"Each State shall establish for the waters identified in the [impaired waters list], and in accordance with the priority ranking, the total maximum daily lead, for those pollutants"*

This section of the clean water act establishes the Central Valley Water Boards authority to establish a TMDL. However, even were the water not listed on the impaired waters list, there is no legal requirement to demonstrate water quality violations prior to establishing either water quality objectives or loading capacity. The Central Valley Water Board would still have authority to establish a TMDL based on Section 303(d)(3) of the Clean Water Act, which specifies;

> *"Each State shall identify all waters within its boundaries which it has not identified under [the impaired water's list] and estimate for such waters the total maximum daily load."*

Finally, authority to establish water quality objectives and a program to implement those objectives, which would include elements such as those found in a TMDL, is provided in state law under the Porter Cologne Water Quality Control Act, section 13241, which states,

> *"Each Regional Board shall establish such water quality objectives in water quality control plans as in its judgment will ensure the reasonable protection of beneficial uses and the prevention of nuisance."*

Although there are few violations of the proposed objectives and loading capacity, Staff does not think it would be appropriate to ignore the presence of chlorpyrifos. As discussed in the staff report, the Central Valley Water Board has determined that numeric water quality objectives are required to ensure reasonable protection of beneficial uses. Establishment of chlorpyrifos numeric objectives that are equivalent to those in the Delta and the San Joaquin River will provide clear and consistent guidance to dischargers as to what constitutes an acceptable level of discharge. A numeric objective also provides the Central Valley Water Board with a straightforward method to address cumulative effects on beneficial uses of diazinon and chlorpyrifos. Finally, establishment of chlorpyrifos numeric objectives will ensure that discharges from the Sacramento and Feather Rivers do not interfere with achievement of the objectives established for the Delta.

4. David B. Weinberg, Wiley Rein & Fielding, LLP

Comment 4-1: Early this year, USEPA released a final Aquatic Life Ambient Water Quality Criteria. (EPA-822-R-05-0006 (December 2005)), notice published 71 Fed. Reg. 9336 (Feb. 23,2006). Based on a comprehensive review of the available data (and recognizing the error in reporting the notorious 1980 Gammarus fasciatus study), USEPA adopted identical 0.170 µg/L acute and chronic standards. MANA believes the USEPA analysis was thorough and reflects the most comprehensive evaluation of available data. MANA thus urges that, if the Boards continue to rely on a toxicity-based calculation to set the numeric diazinon water quality objectives, 0.170 µg/L be adopted as both the acute and chronic objective.

We understand that the Regional Board staff has independently rerun the calculations at issue, after setting aside the previously-relied upon data that has since been found to be unreliable, and has reached slightly different results (0.160 µg/L acute and 0.100 µg/L chronic). MANA urges that these not be adopted here, for two reasons.

First, as MANA has explained in prior comments and USEPA now has concurred, under the circumstances presented in here (where the acute to chronic ratio is very low), there is no basis to adopt different acute and chronic standards. (This same finding of course also was evidenced in the draft criteria, which EPA made available in December, 2003 (68 Fed. Reg 75555 (December 3 1,2003)).

Second, there is considerable value in adopting the same criteria across the nation and, for that matter, around the world. As you are aware, diazinon products are used in many places other than California. MANA and its affiliated companies undertake product stewardship activities in connection with the marketing of these products. There is little doubt that, with USEPA's publication of its final water quality criteria, both diazinon marketers and most (if not all) other jurisdictions will consider these as appropriate concentration guides. If a California jurisdiction - especially one as important as the Central Valley Board adopts a different standard, it can only lead to confusion and make stewardship efforts more complicated and costly.

Response 4-1: Central Valley Water Board staff has reviewed the criteria derived by both the EPA and the California Department of Fish and Game (CDFG). One of the principal differences between the two criteria is in which studies were found to be acceptable for use in deriving the criteria. Specifically,

there were two studies used by EPA that were not considered acceptable by CDFG. In addition, CDFG included additional sensitive species in their calculation of the ACR, and calculated ACRs based on toxicity test results from the same studies or at least the same laboratory. Because the CDFG criteria calculations used a more appropriate ACR and did not use the results from the questionable studies, Central Valley Water Board staff has confirmed CDFG's calculations and recommends them to be adopted as Water Quality Objectives for Diazinon. A complete discussion of the relative merit of the various approaches has been provided in Section 5.0.

References

U.S. EPA. 2001. Fact sheet entitled "Diazinon Revised Risk Assessment and Agreement with Registrants." United States Environmental Protection Agency (UEPA). Washington, D.C. January 2001

U.S. EPA. 2000. Fact sheet entitled "Chlorpyrifos Revised Risk Assessment and Agreement with Registrants." United States Environmental Protection Agency (UEPA). Washington, D.C. June 2000

Strauss, A. 2006. Letter from Alexis Strauss (Director, Water Division, U.S. EPA Region 9) to Tom Howard (Acting Executive Director, California State Water Resources Control Board) dated November 20, 2006, regarding approval of the 2006 303(d) list..

McClure, D., G. Davis, J. Karkoski, Lee, P. 2005. Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Diazinon and Chlorpyrifos Runoff into the Sacramento and San Joaquin Delta. California Regional Water Quality Control Board, Central Valley Region. Sacramento, CA.

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APPENDIX G

SUGGESTED FORMAT FOR COMMENT LETTERS

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Comment letters to the Regional Board on staff recommendations serve two purposes: 1) to point out areas of agreement; and 2) to suggest revisions to staff recommendations. Clear statements of both areas of agreement and suggested revisions will assist the Regional Board and staff in understanding the recommendations of the commenter. In order to aid staff in identifying suggested revisions and to respond to the specific issues raised by the commenter, the following format for comment letters is suggested:

Format for Comments Suggesting Revisions

The suggested format is to number the comment, state in one sentence the topic upon which the comment is directed, provide a supporting argument, and make a specific recommendation. Supporting arguments should include citations, where appropriate. The recommended format is below.

Comment #. *One sentence description or title for the comment*

Suggested revision to the Basin Plan Amendment language or staff report. For suggested revisions to the Basin Plan Amendment language please use underline/strikeout to show changes from the staff proposal. For suggested changes to the staff report, please clearly indicate the section(s) being addressed. The discussion related to the suggested revisions should be clearly supported by reference to applicable law or scientific or technical reports, where appropriate.

Format for Comments Supporting Staff Recommendations

If the commenter concurs with a staff recommendation, a statement to that effect will assist the Regional Board in determining what action, if any, to take on the staff recommendation. In general, no supporting discussion need be presented, unless the commenter feels that the staff recommendation could be further enhanced or clarified. The recommended format is below.

Comment #. *One sentence description or title for the comment*

The provision(s) of the proposed Basin Plan Amendment that the commenter supports should be clearly stated. The commenter may want to provide their reason for supporting the provision of the proposed Basin Plan Amendment, especially if it differs from the staff rationale. Additional legal or scientific citations can also be provided.

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